Trend Study 30-58-03

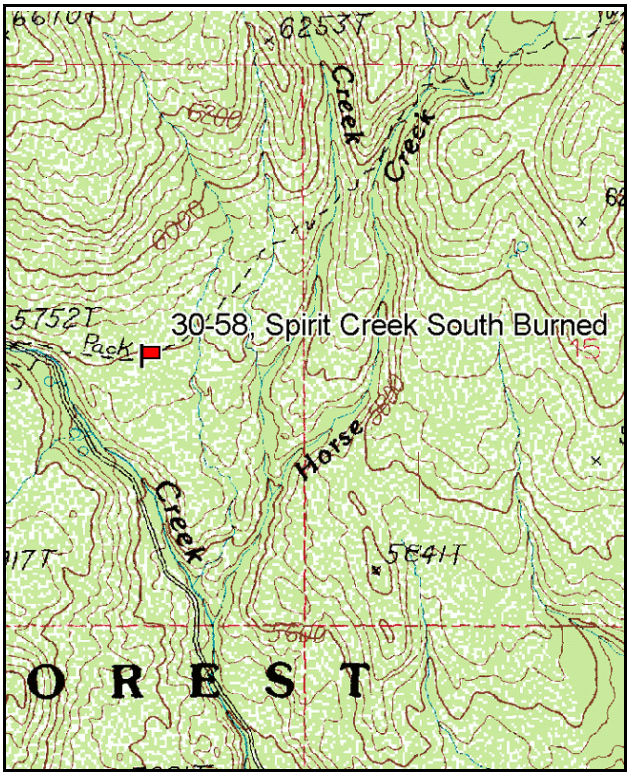
Study site name: Spirit Creek South Burned . Vegetation type: Burn-seeding .

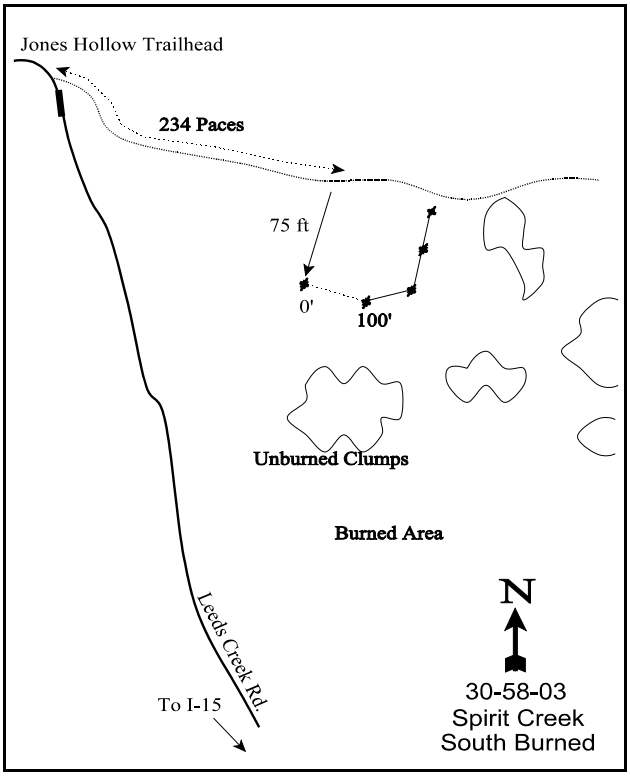
Compass bearing: frequency baseline 111 degrees magnetic. (Line 2, 94°M, line 3 &4, 15°M)

Frequency belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (71ft), line 4 (34ft). No rebar.

LOCATION DESCRIPTION

Traveling south on I-15 from Cedar City, take the first Leeds exit #23 (If traveling north, there is no off ramp at exit #23 take exit #22 and the frontage road to exit #23). Travel northwest on the Leeds Creek Road for 3.25 miles. Stay to the right at the fork and proceed about 4.0 miles towards the Oak Grove campground. Stop just past a bridge at the Jones Hollow (Blake-Harmony) trail head. Hike 234 paces up the trail to a 4-foot tall green fence post 75 feet southwest (212°M) of the trail. This is the 0-foot baseline stake. All stakes are 4 foot tall green fence posts.





Map Name: Signal Peak

Diagrammatic Sketch

Township 40S , Range 14W , Section 16

GPS: NAD 27, UTM 12S 4131708 N, 285031 E

DISCUSSION

Spirit Creek South - Trend Study No. 30-58

The Spirit Creek South Burn trend site consists of a nearly level grass meadow surrounded by Gambel and shrub-live oak. The site has an elevation of 5,800 feet, slope of 4-5%, and a south to southeast aspect. The site, which was previously a mountain big sagebrush flat, was burned in June of 1986 and seeded in early July by the Dixie National Forest. The area is important fawning habitat for mule deer which is evidenced by the abundant pellet groups in 1992. Pellet group data from 1998 also estimated a high level of use at 76 deer days use/acre (188 ddu/ha). Some of the deer pellet groups were fresh when the study was read in 1998 on June 4th. Deer use was much lighter in 2003 with just 17 days use/acre estimated (43 ddu/ha). No cattle grazing occurs in this area.

Soil is a deep sandy loam with little rock on the surface or within the profile. Effective rooting depth is estimated at over 27 inches. The soil is slightly acidic in reactivity (pH 6.1). Due to the flat topography, erosion is not a problem, even with high amounts of bare ground occurring after the fire. The study was established September 16, 1986, about 3 months after the fire. At that time, basal vegetative cover was less than one percent. Bare ground covered 94% of the ground surface, while litter cover left after the fire, averaged only 6%. The site was read again in September of 1987. Basal vegetative cover increased to 10%, litter increased to 16%, conversely bare ground declined to 74%. Some soil movement was noticed, yet it was not significant. During the 1992 reading, soil conditions continued to improve. Basal vegetative cover averaged 23%, while bare ground continued to decline significantly. Litter cover rose to 49%. Protective ground cover has continued to improve. By 2003, percent bare ground had declined to 14%.

The site previously was dominated by mountain big sagebrush. Burned sagebrush stumps counted during the 1986 reading indicated a pre-burn density of approximately 7,100 plants/acre. The only browse left on the site in 1986 consisted of re-sprouting Gambel oak which numbered 3,533 stems/acre. By 1987, there were an estimated 433 seedling sagebrush per acre on the site. Desert ceanothus and broom snakeweed seedlings also appeared in small numbers. Oak increased along the frequency baseline, but declined to 633 young plants/acre on the density plots. During the 1992 reading, there were an estimated 166 plants/acre of sagebrush, 19% of which were classified as decadent. All other sagebrush consisted of seedlings and young. Gambel oak continued to increase on the frequency belts, but disappeared in the density plots. Broom snakeweed occurred in small numbers. During the 1998 reading, the original 100 foot frequency baseline was extended another 300 feet in order to better sample the small meadow. Density of sagebrush increased to 340 plants/acre with no seedlings sampled. Young plants were also rare at only 60 plants/acre. Dead sagebrush listed in the table consisted of old burned stems. Utilization of the sagebrush was mostly light with some moderate use. Vigor was good on all except decadent sagebrush. Density of Gambel oak increased due to the much larger sample as it grows in vigorous scattered clones. Mature plants average nearly 4 feet in height. Sagebrush density declined slightly in 2003, but mature plants were healthy and vigorous with excellent leader growth. Gambel oakbrush increased in stems/acre due to an abundance of young sprouts. Utilization of browse in all years has been light.

The site is now dominated by seeded grasses and alfalfa. However, during the 1986 reading, no seeded species had established. Bottlebrush squirreltail and mutton grass were the only perennial grasses encountered. Forbs consisted of a few early seral species. By 1987, seeded grasses became well established with crested and intermediate wheatgrass being the most common. Seeded forbs, yellow sweetclover and alfalfa, also became well established along with several invasive weedy species. Crested and intermediate wheatgrass continued to dominate the site in 1992 with quadrat frequencies of 91% and 92% respectively. Smooth brome was also fairly abundant. Two species, orchard and mutton bluegrass, were not encountered in 1992. During the 1998 reading, intermediate wheatgrass was by far the most abundant species. It provided 58% of the grass cover and had a cover value of 23%. Crested wheatgrass and smooth brome were the only

other common perennial species as they accounted for 24% and 11% of the grass cover respectively. Annual cheatgrass was also encountered in 1998. Cheatgrass is found in the interspaces between bunch grasses, yet it is not abundant.

The forb composition is diverse but only a few species are abundant. Seeded forbs have all disappeared with the exception of alfalfa and a few yellow sweet clover. During the 1998 reading, alfalfa accounted for 82% of the forb cover. Forb diversity and abundance is likely hindered by the abundance of aggressive exotic grasses seeded onto the site.

1992 TREND ASSESSMENT

Soil conditions have improved dramatically since the burn. Basal vegetative cover has increased every year, while percent bare soil has declined. Litter cover has increased from 6% to 49%. Browse are not abundant on the site, but some sagebrush has become reestablished and oak has resprouted. Overall, the browse trend is down when compared to the pre-burn conditions, but has improved since the fire. Further improvements in the browse composition may be hindered by the dominance of seeded exotic grasses. The herbaceous understory has improved significantly since the burn. From 1986 to 1987, both grass and forb sum of nested frequencies increased significantly. Sum of nested frequency for crested wheatgrass and intermediate wheatgrass, and smooth brome continued to increase between 1987 and 1992. Other seeded and native grasses declined or disappeared from the site. Forb nested frequencies declined during the same interval. The only common forbs left on the site are a *Euphorbia* sp. and alfalfa. Combined nested frequencies of grasses and forbs have not increased since 1987. Overall, herbaceous understory has improved between 1986 and 1987 and is stable between 1987 and 1992. One area of concern is the lack of forbs on the site which are important for spring and summer forge for deer (Valentine 1990).

TREND ASSESSMENT
soil - up (5)
browse - up but limited (5)
herbaceous understory - stable (3)

1998 TREND ASSESSMENT

Trend for soil continues to improve with percent bare ground declining from 28% to 18% and litter cover increasing from 49% to 68%. Erosion does not appear to be a problem on this site. Trend for browse appears to be up slightly. Density of mountain big sagebrush has increased and broom snakeweed density has declined 55%. Use of the limited sagebrush is not as heavy as reported in 1992. Trend for the herbaceous understory is mixed. Trend for grasses is up with a significant increase in the nested frequency of intermediate wheatgrass and smooth brome. Sum of nested frequency for forbs has declined slightly. The most abundant forb, alfalfa, has remained stable however. Trend is considered up slightly, yet the forb composition is poor.

TREND ASSESSMENT
soil - up (5)
browse - up slightly (4)
herbaceous understory - up slightly (4)

2003 TREND ASSESSMENT

Trend for soil is stable. Relative percent cover of bare ground, litter, and vegetation are similar to 1998 estimates. There is no erosion occurring on the site due to the abundant protective ground cover consisting mostly of perennial grasses. Trend for the key browse species, mountain big sagebrush, is stable. Density of

mature plants has remained similar to 1998 but the number of young plants has declined. Mature sagebrush sampled in 2003 were very vigorous and annual leader growth averaged 2.6 inches by June 3rd. Gambel oakbrush, which occurs in scattered clones, has remained stable. Trend for the herbaceous understory is down slightly. Sum of nested frequency for perennial grasses has declined, while frequency of perennial forbs has increased. Nested frequency for all perennial grasses have declined significantly but they are still abundant. Average cover of perennial grasses declined from 37% to 20% due to drought. Nested frequency of alfalfa increased significantly but average cover declined from 7% to 3%. Annual *Microsteris gracilis* increased significantly and provided 68% of the total forb cover in 2003.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --
Management unit 30 , Study no: 58

Type	Species	Nested Frequency					Average Cover %	
		'86	'87	'92	'98	'03	'98	'03
G	Agropyron cristatum	a-	c187	c223	c203	b129	9.51	6.75
G	Agropyron intermedium	a-	b163	d268	e299	c215	22.76	9.99
G	Bromus inermis	a-	b33	b62	d166	c112	4.42	3.32
G	Bromus tectorum (a)	-	-	-	b197	a45	1.82	.53
G	Dactylis glomerata	a-	b19	a-	a-	a-	-	-
G	Festuca ovina	a-	b15	a2	a5	a-	.18	-
G	Poa fendleriana	ab2	b14	a-	ab2	a-	.15	-
G	Poa pratensis	-	-	-	-	-	.00	-
G	Sitanion hystrix	5	10	2	1	1	.03	.00
G	Vulpia octoflora (a)	-	-	-	a36	b60	.40	1.25
Total for Annual Grasses		0	0	0	233	105	2.22	1.78
Total for Perennial Grasses		7	441	557	676	457	37.07	20.07
Total for Grasses		7	441	557	909	562	39.30	21.86
F	Agoseris glauca	-	-	-	9	-	.04	-
F	Camelina microcarpa (a)	-	-	-	-	1	-	.00
F	Calochortus nuttallii	-	-	-	-	3	-	.01
F	Chenopodium spp. (a)	3	-	2	-	2	-	.00
F	Crepis acuminata	-	-	1	-	-	-	-
F	Cymopterus spp.	-	-	-	5	6	.02	.01
F	Draba spp. (a)	-	-	-	a22	b41	.09	.19
F	Dracocephalum parviflorum	-	-	-	-	1	-	.03
F	Erodium cicutarium (a)	-	-	-	-	2	-	.07
F	Erigeron spp.	-	-	3	-	-	-	-

Type	Species	Nested Frequency					Average Cover %	
		'86	'87	'92	'98	'03	'98	'03
F	Euphorbia spp.	17	16	23	9	27	.06	.56
F	Gilia spp. (a)	-	-	-	-	47	-	.55
F	Lotus utahensis	6	12	6	6	3	.33	.01
F	Melilotus officinalis	$_{a}$-	$_{b}$24	$_{a}$-	$_{a}$-	$_{a}$6	-	.01
F	Medicago sativa	$_{a}$-	$_{d}$88	$_{bc}$41	$_{b}$40	$_{cd}$82	7.13	3.40
F	Microsteris gracilis (a)	-	-	-	$_{a}$183	$_{b}$254	1.00	10.71
F	Nicotiana attenuata (a)	$_{a}$-	$_{b}$39	$_{a}$-	$_{a}$-	$_{a}$-	-	-
F	Penstemon leonardi	-	2	-	-	-	-	-
F	Physalis spp.	-	5	-	-	-	-	-
F	Sanguisorba minor	-	2	-	-	-	-	-
F	Sphaeralcea grossulariaefolia	$_{a}$-	$_{a}$3	$_{a}$-	$_{a}$-	$_{b}$18	-	.09
F	Tragopogon dubius	-	-	-	-	3	-	.00
F	Unknown forb-perennial	-	-	6	-	-	-	-
Total for Annual Forbs		3	39	2	205	347	1.09	11.55
Total for Perennial Forbs		23	152	80	69	149	7.59	4.14
Total for Forbs		26	191	82	274	496	8.69	15.69

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 30 , Study no: 58

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Arctostaphylos patula	2	1	.03	.15
B	Artemisia tridentata vaseyana	13	11	.45	1.04
B	Gutierrezia sarothrae	3	1	.15	-
B	Opuntia spp.	2	0	.30	-
B	Quercus gambelii	27	27	5.15	1.98
B	Quercus turbinella	4	1	.03	.18
Total for Browse		51	41	6.11	3.35

CANOPY COVER, LINE INTERCEPT --
Management unit 30 , Study no: 58

Species	Percent Cover	
	'98	'03
Arctostaphylos patula	-	.36
Artemisia tridentata vaseyana	-	1.93
Quercus gambelii	1.20	4.43

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 30 , Study no: 58

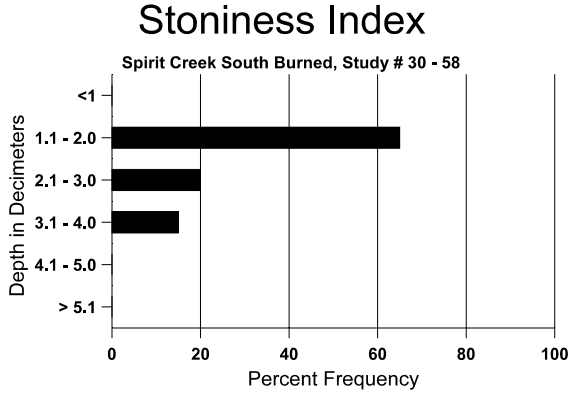
Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	2.6

BASIC COVER --
Management unit 30 , Study no: 58

Cover Type	Average Cover %				
	'86	'87	'92	'98	'03
Vegetation	.25	9.75	22.50	55.70	43.92
Rock	0	0	0	.02	0
Pavement	0	.25	.75	.51	.24
Litter	5.50	15.75	48.50	68.34	58.87
Cryptogams	0	0	0	.46	.17
Bare Ground	94.25	74.25	28.25	18.20	13.81

SOIL ANALYSIS DATA --
Management unit 30, Study no: 58, Study Name: Spirit Creek South Burned

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
27.4	42.8 (1998) (17.7)	6.1	64.0	21.4	14.6	1.8	15.2	176.0	0.7



PELLET GROUP DATA --
Management unit 30 , Study no: 58

Type	Quadrat Frequency	
	'98	'03
Rabbit	1	8
Deer	55	30

Days use per acre (ha)	
'98	'03
-	-
76 (188)	17 (43)

BROWSE CHARACTERISTICS --
Management unit 30 , Study no: 58

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Arctostaphylos patula											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**40**	-	-	40	-	20	50	0	-	0	14/19
03	**20**	-	-	20	-	-	0	0	-	0	30/55
Artemisia tridentata vaseyana											
86	**0**	-	-	-	-	-	0	0	0	0	-/-
87	**0**	433	-	-	-	-	0	0	0	0	-/-
92	**166**	33	133	-	33	-	20	20	20	0	-/-
98	**340**	-	60	200	80	1880	18	0	24	18	17/24
03	**280**	-	-	280	-	80	0	0	0	0	31/38
Ceanothus greggii											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	133	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	52/69
Eriodictyon angustifolium											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	13/13
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Gutierrezia sarothrae											
86	**0**	-	-	-	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
87	**366**	-	33	333	-	-	0	0	-	9	9/7
92	**266**	-	133	133	-	-	0	0	-	0	10/15
98	**120**	-	-	120	-	-	0	0	-	0	6/12
03	**20**	-	-	20	-	-	0	0	-	0	6/6
Opuntia spp.											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**66**	-	66	-	-	-	0	0	-	0	-/-
92	**33**	-	-	33	-	-	0	0	-	100	6/9
98	**40**	-	-	40	-	-	100	0	-	100	8/22
03	**0**	-	-	-	-	-	0	0	-	0	11/11
Purshia tridentata											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	25/40
Quercus gambelii											
86	**0**	3533	-	-	-	-	0	0	0	0	-/-
87	**633**	-	633	-	-	-	5	0	0	0	-/-
92	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**2000**	60	600	1240	160	660	5	0	8	0	45/48
03	**2740**	60	1120	1060	560	3080	3	0	20	1	44/24
Quercus turbinella											
86	**0**	-	-	-	-	-	0	0	0	0	-/-
87	**0**	-	-	-	-	-	0	0	0	0	-/-
92	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**80**	-	20	20	40	20	0	0	50	50	50/59
03	**20**	20	-	-	20	40	0	0	100	100	51/46